QP Code: R261B017 | Reg. No | | | | | | | | | | | AY 25

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

M.Tech. (Second Semester - Regular) Examinations, May – 2026

24MTEPC12002 – Advanced Fluid Mechanics

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Define stress tensor in fluid mechanics.	CO1	K1
b.	What is velocity potential? State its properties.	CO1	K2
c.	Define stream function and state its significance.	CO1	K1
d.	What are constitutive equations?	CO2	K1
e.	Define mixing length in turbulent flow.	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

	Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a.	Explain Eulerian and Lagrangian approaches with advantages.	5	CO1	K2
b.	Derive expression for vorticity and explain its components.	5	CO1	K3
	(OR)			
c.	For velocity potential $\phi=3x^2+3y^2$, determine velocity and check continuity.	5	CO1	K2
d.	Discuss stream function and velocity potential relation.	5	CO1	K3
3.a.	Explain transport theorem with derivation.	5	CO2	K3
b.	Discuss assumptions used in deriving Navier–Stokes equations.	5	CO2	K2
	(OR)			
c.	Oil flows in Couette system: plate spacing 4 mm, velocity = 1.5 m/s. Find shear stress and force per unit area if viscosity = 0.3 Ns/m².	5	CO2	K4
d.	Explain exact solutions of Navier–Stokes equations.	5	CO2	K2
4.a.	Explain flow near a rotating disk.	5	CO3	K2
b.	Derive velocity distribution for Hagen–Poiseuille flow.	5	CO3	K3
	(OR)			
c.	Discuss flow between concentric rotating cylinders.	5	CO3	K2
d.	Explain Stokes' problems with applications.	5	CO3	K2
5.a.	Explain Falkner–Skan solution in boundary layer theory.	5	CO4	K2
b.	Discuss approximate methods in boundary layer analysis.	5	CO4	K2
	(OR)			
c.	Explain momentum integral equation for boundary layer.	5	CO4	K3
d.	Describe hydrodynamic lubrication theory with assumptions.	5	CO4	K2
6.a.	Explain Reynolds decomposition and velocity correlations.	5	CO5	K3
b.	Explain Karman's velocity distribution law.	5	CO6	K2
	(OR)			
c.	Discuss Reynolds stresses and their significance.	5	CO5	K2
d.	Describe universal velocity profile in turbulent flow.	5	CO6	K2

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